CLAIMS

What is claimed is:

1. A low profile splicing stage for fusion joining a first optical fiber and a second optical fiber, said stage comprising:

   a) an electric arc welding system;

   b) a clamping and fiber position adjustment system comprising holding means for holding said fibers in a fiber plane and motion means for moving said fibers in three orthogonal dimensions into coaxial, abutting alignment along a common fiber axis in said fiber plane; and

   c) an imaging optical system having a fiber imaging illuminator and a fiber image detector, said imaging optical system being adapted to acquire optical images of said fibers in a first imaging direction and a second imaging direction, said imaging directions being non-coincident, and said image detector providing an electrical signal adapted to be received by imaging electronics and processed to produce a display.

2. A splicing stage as recited by claim 1, wherein said fiber imaging illuminator comprises a first light source for said first imaging direction and a second light source for said second imaging direction; and light from said first source traverses a first optical path and light from said second source traverses a second optical path, each of said optical paths being multiply folded and comprising optical elements located above and below said fiber plane and said first and second optical paths lie in a plane perpendicular to said common fiber axis.

3. A splicing stage as recited by claim 2, wherein said fiber imaging illuminator comprises a first light source for said first imaging direction and a second light source for said second imaging direction.

4. A splicing stage as recited by claim 2, wherein said first and second imaging directions are substantially mutually orthogonal.

5. A splicing stage as recited by claim 2, wherein said fiber image detector comprises a single imaging device.

6. A splicing stage as recited by claim 2, wherein said fiber image detector comprises a CMOS device.

7. A splicing stage as recited by claim 1, wherein said electric arc welding system comprises a first electrode and a second electrode disposed oppositely and coaxially along a direction perpendicular to said common fiber axis and adapted to be operably connected to fusion control electronics that activate said electric arc welding system and supply high voltage thereto, whereby said fibers are welded.

8. A splicing stage as recited by claim 1, said stage having a mounting base and further comprising a stage cover, at least a portion of which is movable in a plane parallel to said mounting base, said movable portion having an open position and a closed position.

9. A splicing stage as recited by claim 8, wherein said movable portion is slidably movable in said plane.

10. A splicing stage as recited by claim 8, wherein said stage cover is opaque.

11. A splicing stage as recited by claim 8, wherein said holding means comprises first and second joint clamps actuated by the motion of said stage cover, each having a flat portion adapted to secure the end of a fiber for fusion, said first

joint clamp engaging the end of said first fiber and said seond joint clamp engaging the end of said second fiber.

12. A splicing stage as recited by claim 1, wherein said holding means comprises first and second clamp assemblies.

13. A splicing stage as recited by claim 12, wherein said first and second clamp assemblies are removable and have alignment pins for locating said assemblies in said splicing stage.

14. A splicing stage as recited by claim 13, wherein said first and second removable clamp assemblies each comprise a flat portion, an aligning V-block, and a fiber clamp openable at a pivot.

15. A splicing stage as recited by claim 1, wherein said motion means comprises at least one electric motor adapted to drive at least one of said fibers.

16. A splicing stage as recited by claim 1, wherein said electric motor gearlessly drives said fiber.

17. A splicing stage as recited by claim 15, comprising a first electric motor adapted to drive said first fiber axially and a second electric motor adapted to drive said second fiber axially.

18. A splicing stage as recited by claim 1, wherein said motion means comprises at least one piezoelectric actuator.

19. A splicing stage as recited by claim 18, wherein said motion means comprises a first transverse piezoelectric actuator adapted to drive one of said fibers in a first transverse direction substantially perpendicular to said common fiber axis; and a second transverse piezoelectric actuator adapted to drive one of said fibers in a second transverse direction substantially perpendicular to said first transverse direction and said common fiber axis.

20. A splicing stage as recited by claim 19, wherein said first transverse piezoelectric actuator is adapted to drive said first fiber and said second transverse piezoelectric actuator is adapted to drive said second fiber.

21. A splicing stage as recited by claim 19, wherein said first and said second transverse piezoelectric actuators are adapted to drive one of said fibers.

22. A splicing stage as recited by claim 22, wherein said motion means comprises an axial piezoelectric actuator adapted to drive one of said fibers in said common fiber direction.